Assets Planning and Delivery Group
Engineering

Strategic Product Specification

SPS 249
Bladder Surge Vessels

VERSION 1
REVISION 4

MAY 2023

FOREWORD

Each Strategic Product Specification has been prepared to inform Water Corporation staff, consultants, contractors and land developers of the requirements for selecting and acquiring a manufactured product to be used in strategic Corporation infrastructure. The definition of 'Product' includes items that comprise assembled components, equipment or plant for mechanical, electrical and civil infrastructure applications.

The objective of a Strategic Product Specification is to specify fit-for-purpose Product which will contribute to the provision of effective water services at least whole-of-life cost and with least risk to service standards and safety. A Strategic Product Specification also provides uniform standards for compatibility of new water infrastructure with existing water assets.

Many Strategic Product Specifications have drawn on the design, asset management and operational experience of Product performance in live service gained by the Corporation over time. Some Strategic Product Specifications have drawn on the experience of the water industry nationally by referencing Australian or WSAA standards.

Strategic Product Specifications are intended for reference and use in the following typical procurement scenarios:

- Capital funded infrastructure design and construction work;
- Private developer funded subdivision infrastructure for takeover by the Corporation;
- Operationally funded infrastructure design and construction work;
- Corporation period contracts for Product purchases;
- Product purchases for stock or for miscellaneous minor work.

A published Strategic Product Specification will, in some cases, comprise technical content that is typical of a range of products of the same type (type specification) but may exclude specific requirements that should apply to a particular project or application. In such cases, the project designer is required to document the supplementary project specific requirements in the 'Project Specific Requirements' Appendix of the Specification.

The text of a published Specification should not be directly modified. In the event that a text variation is considered necessary to accommodate the needs of a particular project or application, the text modification should be documented in the appropriate Clause of a 'Project Specific Requirements' Appendix.

Enquiries relating to the technical content of this Specification should be directed to the Principal Engineer, Mechanical, Engineering to whom all enquiries relating to the technical content of the Specification should be directed. Future Specification changes, if any, will be issued to registered Specification users as and when published.

Head of Engineering

This document is prepared without the assumption of a duty of care by the Water Corporation. The document is not intended to be nor should it be relied on as a substitute for professional engineering design expertise or any other professional advice.

Users should use and reference the current version of this document.

REVISION STATUS

The revision status of this specification is shown section by section below:

REVISION STATUS						
SECT.	**VER./ REV.**	**DATE**	**PAGES REVISED**	**REVISION DESCRIPTION (Section, Clause, Sub-Clause)**	**RVWD.**	**APRV.**
1	1/0	23.05.13	All	New Standard		
	1/1	30.11.15	8	Additional Australian Standards referenced	MB	SE
	1/2	20.02.17	9	Reference to DS36 removed and replaced with Strategic Products Register	SS	SE
All	**1/4**	**24.05.23**	**All**	**Periodic Review – no change required**	**SE**	**SE**
2	1/0	23.05.13	All	New Standard		
3	1/0	23.05.13	All	New Standard		
4	1/0	23.05.13	All	New Standard		
	1/1	30.11.15	16	"Shipping" removed	MB	SE
5	1/0	23.05.13	All	New Standard		
	1/3	14.06.17	17	External coating updated.	MB	SE
6	1/0	23.05.13	All	New Standard		
	1/1	30.11.15	19	Minor edit Sec6.2 Table number reference changes from 11.1 to 14.1	MB	SE
7	1/0	23.05.13	All	New Standard		
8	1/0	23.05.13	All	New Standard		
9	1/0	23.05.13	All	New Standard		
	1/1	30.11.15	24	Minor edits	MB	SE
10	1/0	23.05.13	All	New Standard		
	1/1	30.11.15	25	10.1, 10.2, 10.3 new	MB	SE
11	1/0	23.05.13	All	New Standard		
12	1/0	23.05.13	All	New Standard		

13	**1/0**	**23.05.13**	**All**	**New Standard**		
	1/1	**30.11.15**	**29**	**Reference to Appendix C added. Clause 10 added to Table 13.1**	**MB**	**SE**

14	**1/0**	**23.05.13**	**All**	**New Standard**		
	1/1	**30.11.15**	**30-31**	**Table 14.1 updated with new sections**	**MB**	**SE**

15	**1/0**	**23.05.13**	**All**	**New Standard**		
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	1/3	**14.06.17**	**34**	**MMR's Added**	**IP**	**SE**

Strategic Product Specification
SPS 249
Bladder Surge Vessels

CONTENTS

1 Scope and General

1.1 Scope and General

Surge vessels are used by The Corporation for the protection of piping systems from either negative or excessively high pressures occurring during transient events, usually associated with the starting or stopping of pumps. For large pump stations, and powered sites, conventional air/water vessels are generally preferred. Bladder vessels may be selected where a limited operating volume is required or for sites where electrical power, for compressor operation, is not available. **Guidance on use, limitations and requirements of bladder surge vessels is provided in DS35-01 and must be considered prior to use of this specification.**

Bladder surge vessels incorporate a water filled internal butyl rubber bladder designed to provide water/gas separation, surrounded by a pre-charged cushion of gas (usually Nitrogen). Fluctuations in pressure which occur during transient events (Surge pressures) in the piping system are mitigated (reduced) by the transfer of pressure energy between the piping system and the gas charge in the vessel.

This Specification sets out requirements for the design, manufacture, production testing, handling and delivery of small *vertical bladder surge vessels of sizes 1m^3, 2m^3 and 3m^3; and pressure rating PN16*. The Specification also details the means by which compliance with the Specification shall be demonstrated and the criteria for acceptance of Product.

This purchaser must complete the *Purchasing Schedule* (section 13) when using this specification for the procurement of a vessel.

1.2 Referenced Documents

The following documents are referenced in this Specification:

Water Corporation "Strategic Product Appraisal Process Manual" (Internally controlled)

AS

AS 1110.1	ISO metric hexagon bolts and screws
AS 1112.1	ISO metric hexagon nuts – Style 1 – Product grades A and B
AS 1170.4	Structural Design Actions – Seismic Actions
AS 1210	Pressure Vessels Note: This version of this standard is consistent with AS1210-2010.
AS 1214	Hot-dip galvanized coatings on threaded fasteners (ISO metric coarse thread series)
AS 1271	Safety Valves, Other Valves, Liquid Level Gauges and Other Fittings for Boilers and Unfired Pressure Vessels
AS 1548	Fine Grained, Weldable Steel Plates for Pressure Equipment
AS 1554	Structural Steel Welding
AS 1646	Elastomeric seals for waterworks purposes
AS 1657	Fixed Platforms, Walkways, Stairways and Ladders – Design and Installation
AS 1796	Certification of Welders and Welding Supervisors
AS 2550.1	Cranes, hoists and winches - Safe use - General requirements
AS 2550.3	Cranes, hoists and winches - Safe use - Bridge, gantry, portal (including container cranes), jib and monorail cranes
AS 2550.5	Cranes, hoists and winches - Safe use - Mobile cranes
AS 2550.11	Cranes, hoists and winches - Safe use - Vehicle-loading cranes
AS 2700S (N14)	Colour Standard for General Purpose - White
AS 2971	Serially produced pressure vessels
AS 3595	Fire Prevention
AS 3788	Pressure Equipment – In-service Inspection
AS 3873	Pressure Equipment – Operation and Maintenance
AS 3894.1	Site Testing of Protective Coatings – Non-conductive Coatings – Continuity Testing – High Voltage ('Brush') Method
AS 4041	Pressure Piping
AS 4087	Metallic Flanges for Waterworks Purposes
AS 4100	Steel Structures

AS 4343	Hazard Levels
AS 4458	Pressure Equipment - Manufacture

AS/NZS

AS/NZS 1170	Structural Design Actions – General Principals
AS/NZS 1170.2	Structural Design Actions – Wind Actions
AS/NZS 1200	Pressure Equipment
AS/NZS 3788	Pressure Equipment – In Service Inspection
AS/NZS 3992	Pressure Equipment – Welding and Brazing Qualification
AS/NZS 4020	Testing of Products for Use in Contact with Drinking Water

AS/NZS ISO

9001	Quality management systems – requirements

American Standards

ASTM A106	Seamless Pipe
ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
ASTM A194	Standard Specification for Carbon and Alloy Steel Nuts for High Pressure or High Temperature Service, or Both
ASTM A312	Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
ASTM A320	Standard Specification for Alloy Steel and Stainless Steel Bolting for Low Temperature Service
ASTM A666	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
ANSI SA 516-70	Pressure Vessel Plate
API 520	Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries
ASME VIII	Section VIII-Rules for Construction of Pressure Vessels Division 1

European Standards

EN1092	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN Designated – Part 1: Steel Flanges
BS PD5500	Specification for Unfired Fusion Welded Pressure Vessels
EN 13445	Unfired Pressure Vessels

Water Corporation Standards

A1	Surface Preparation for the Application of Protective Coatings on Steel or Cast Iron
B2	Inorganic Zinc Silicate, Epoxy Primer Tie-Coat, Acrylic Top Coating on Steel or Cast Iron
D1	High Build Epoxy Coating on Steel or Cast Iron
DS 30-02	General Design Criteria - Mechanical
DS 31-01	Pipework – Mechanical
DS 35	Ancillary Plant - Mechanical
DS 35-01	Surge Vessels
DS 38-03	Flange Bolting
J1	Anti-Graffiti Coating on Old and New Steel Structures
WS1	Metal Arc Welding

Strategic Products Register

1.3 Definitions and Notation

The following definitions are intended to clarify the terminology used in this Specification.

1.3.1 Australian Standards®

Standards that are developed published and maintained by Standards Australia.

1.3.2 Compliant Product

Product that has been assessed, by means of Product Appraisal, as conforming to standards and specifications that are specified by the Corporation.

1.3.3 Corporation

The Water Corporation of Western Australia.

1.3.4 Contractor

An entity or combination of entities that are responsible for selection, processing and control of Product constituent materials or compounds and for the processing equipment that collectively result in the manufactured product.

1.3.5 Notation

Statements governed by use of the word ‘shall’ are mandatory or ‘normative’ requirements of the Specification. Statements expressed by use of the words ‘should’ or ‘may’ are ‘informative’ but not mandatory and are provided for information and guidance. Notes in Specification text are informative. Notes that form part of Specification Tables are normative. An Appendix to the Specification that is designated ‘normative’ contains mandatory requirements. An Appendix that is designated ‘informative’ is provided for information and guidance only. The term ‘specified’ includes requirements of the Specification and requirements stated or referenced in other project documentation.

1.3.6 Officer

A duly authorised representative or appointed agent of the Corporation.

1.3.7 Product

A single unit or multiple units of manufactured end product or an assembly of manufactured component products, materials or equipment. This Specification and accompanying Purchasing Schedule define the nature and details of Product to be supplied.

NOTE 1: An end product is most commonly an output of manufacturing processes that result in finished end products having the same features and characteristics and can be the result of a single or multiple production batches.

NOTE 2: Manufactured equipment and assemblies of Product components or materials are commonly procured for mechanical, electrical and civil infrastructure applications.

1.3.8 Product Appraisal

A formal process whereby Product, including product design, is subjected to systematic engineering assessment to determine Product fitness for prescribed end uses and to evaluate conformity of its production systems with specified standards and requirements. Product Appraisal includes verification of the extent of compliance in accordance with the requirements of a relevant ‘Technical Compliance Schedule’.

1.3.9 Product Assessor

An organization, Officer or other person who, having demonstrated specialist product knowledge and competence acceptable to the Corporation, is appointed to evaluate Product, appraises the Product and issues one or more Product Verification Reports.

1.3.10 Product Verification Report

A formal report wherein a Product Assessor evaluates the extent of Product compliance with the specified product standards and specifications.

NOTE: Verification may be on a project-by-project basis or at agreed intervals, as appropriate to the scope of a Purchasing Schedule and Product end use, subject to determination by the Corporation.

1.3.11 Product Warranty

A formal express undertaking by a Supplier that indemnifies the Corporation against the consequences of supplied Product failure to comply with specified fitness for application and in-service life expectancy performance requirements.

1.3.12 Purchasing Schedule

A Corporation purchase order, tender, schedule of prices, bill of quantities, or specification that details the nature, quantity and other characteristics of Product to be supplied, purchased or installed.

1.3.13 Quality System

A management system that establishes, documents, implements and maintains organizational structures, resources, responsibilities, processes and procedures for the manufacture of Product and provision of Product related services in accordance with the requirements of AS/NZS ISO 9001.

1.3.14 Standards Australia

The peak non-government standards development body in Australia which develops Australian Standards®.

1.3.15 Strategic Product

An essential infrastructure component whose performance is critical to the elimination of risk to the safe and effective provision of water services, which are functions of the Corporation under the Water Corporation Act as licensed under the Water Services Coordination Act.

NOTE: Strategic product is a component of permanent Corporation infrastructure. Ancillary operational and safety equipment that does not form part of permanent infrastructure but offers exceptional enhancements in operational performance or personnel safety may also be deemed strategic.

1.3.16 Strategic Product Appraisal Process

The process described in the Strategic Product Appraisal Process Manual whereby manufactured products and equipment are evaluated and, where they comply with specified requirements, authorised for use in Corporation infrastructure.

1.3.17 Supplier

An entity or combination of entities that is responsible for the supply of Product.

NOTE: A Supplier may be a contractor, owner, producer, distributor, vendor, agent, tenderer or manufacturer for supply of Product or Product related service.

1.3.18 Testing

The determination of Product characteristics by inspection and by the application of specified test procedures.

2 Materials and Components

2.1 Materials

Unless otherwise specified, any material to be incorporated in the Works shall be new and be in accordance with Australian design standard AS 1210 and manufacturing standard AS 4458. Any deviations shall be made in writing and seek approval from the Principal's Representative.

All materials in contact with the water in the vessel shall have AS/NZS 4020 approval.

The vessel shall be constructed from the following materials:

Component	Material	Standard	Grade
Shell and Heads	Carbon and carbon-manganese steel	AS 1548 or SA516	
Nozzles	Carbon-manganese steel	AS 4041, ASTM A106	
Flanges	Carbon and carbon-manganese steel	EN1092	
Fixing and Fitted Bolts and Dowels	Stainless steel	ASTM A193, ASTM A320	Gr 316
Nuts for fixing and fitted Studs and Bolts	Stainless steel	ASTM A194	Gr 316
Gas charging line	Stainless steel	ASTM A312M	Gr 316
Bladder	Butyl rubber		Food grade
Burst disc & holder	Stainless steel	ASTM A666	Gr 316
Supports and structural components	Mild steel	AS 3678 or SA283	

3 Design

3.1 Standard Designs

The Water Corporation has 'standardised' on PN16 vertical Bladder Vessels of the following total volumetric sizes:

- $1m^3$
- $2m^3$
- $3m^3$

The Vessel shall be manufactured to the Corporation's standard size, be freestanding, and of proven design. The operating fluid shall be either potable water or treated effluent, and the vessel will be exposed to ambient conditions and temperatures ranging 0-50°C under normal operation.

Deviations to the standard sizing and pressure rating shall be subject to approval by the Corporation's *Principal Mechanical Engineer, Infrastructure Design Branch*.

3.2 General Design Requirements

The design of Bladder Vessels shall comply with the requirements of AS 1210 and as specified in the Purchasing Schedule. The Bladder Vessels shall be provided with protective devices and other fittings in accordance with the requirements of AS 1210.

The vessel shall be designed and manufactured to withstand the forces arising from normal and abnormal operating conditions and maintenance operations without undue distortion or cracking.

A corrosion allowance of 1mm shall be applied for design of the vessel shell, head and nozzles.

The Contractor shall obtain third party verification of the vessel design and shall submit the design to the Principal's Representative for comment and acceptance. Upon acceptance of the design the Contractor shall register the design with WorkSafe Western Australia. Manufacture shall not to proceed until the design has been registered.

3.3 Nozzles, Connections and Fittings

The Water Corporation has standardized on the following inlet/outlet nozzle sizes:

Vessel Total Volume	Inlet/outlet nozzle size
$1m^3$	DN150
$2m^3$	DN200
$3m^3$	DN200

Deviations to the standard nozzle sizing shall not be made without prior approval of the *Principal Mechanical Engineer, Infrastructure Design Branch*.

Two flanged tapping points shall be provided in the inlet/outlet nozzle. These tapping points shall be of size DN100. Where this is not practicable, the tapping points shall be DN50.

The vessel charging nozzle shall be a Schrader valve and permanently fixed to the side of the vessel at a safe working height of 1100mm above ground level. A pressure gauge shall be located adjacent to the charging connection to display the vessel charge pressure.

A pressure relief system shall be provided at the top of the surge vessel in the form of a bursting disc. The disc shall be connected to the stainless steel charging line and rupture when the gas pressure reaches the vessel Design Pressure.

A stainless steel ball isolation valve shall be fitted to the gas charging line immediately upstream of the charging nozzle to enable isolation of the vessel from gas supply. A further stainless steel ball isolation

valve shall be fitted to a tapping point on the gas charging line for the installation of pressure transducers (by others).

3.4 Flanges

Bolted flanged connections shall be to EN1092 PN16 and comply with the requirements of AS 1210.

The pipework flanges shall be machined on the front faces after workshop welding has been completed, and if necessary, spot faced on the back face around each hole. After machining, all steel machined flange faces shall be given a removable protective coating such as “Lanotec Type A grease”.

The Contractor shall insulate any dissimilar metals in the nozzle flange assembly.

Blank flanges shall be provided for the inlet/outlet tapping points. These shall be centrally fitted with a ‘weldolet’ tapped to 1” BSP.

3.5 Fasteners

The Contractor shall supply all fasteners with washers and gaskets necessary for the completion of the Works. Fastener threads shall conform to AS 1257. Bolts and studs shall be sized so that excessive threads do no protrude past the nut assembly and such that a neat and uniform appearance is maintained. Steel washers shall be placed under bolt heads and nuts.

All steel fasteners and washers shall be stainless steel. A high quality solid type lubricant, such as molybdenum disulphide, shall be applied to the bolts to prevent galling.

Where the fasteners are in contact with mild steel material, a G10 insulating washer shall be fitted underneath the stainless steel washer. Where practicable, a mylar insulating sleeve shall be fitted around the bolt (not possible for tapped connections).

3.6 Lifting Lugs and Air Pipework Support Brackets

The vessels shall include all lifting trunnions, lugs or eyes to facilitate safe handling during transit and installation.

Location of lifting lugs and air charge pipework shall not clash during lifting.

3.7 Supports

The vessel shall be supported on legs which shall extend below the inlet/outlet nozzle flange face. The legs shall be capable of withstanding the maximum imposed loadings without causing excessive localised stresses and deformations in the vessel’s wall and instability to the vessel.

The supports shall be designed in accordance with AS 1210 to allow for movement of the vessel’s wall due to thermal and pressure changes, and also for the possibility that highest stress may occur in some vessels under hydrostatic test before operating pressure is applied. Considerations shall also be made for site wind and seismic conditions.

Where additional height is required, the vessel may be mounted on extension legs or alternative support structure.

Design of supporting members (brackets, column etc.) and anchors shall conform to AS 4100.

3.8 Inspection Openings

Internal access to the vessel shall be provided in order to carry out visual inspection and installation/removal of the bladder. The opening on the upper dished end is accepted as an inspection opening. The opening is a head hole / hand hole only, not intended for personnel entry.

3.9 Over Pressure Protection

The vessel shall be provided with over pressure protection as required by AS 1210 in the form of a burst disc. The Contractor shall be responsible for sizing, specifying and providing a suitable burst disc.

No isolation points shall be located in the charge line between the vessel and burst disc.

3.10 Bladder

The bladder shall be fabricated from a food grade butyl rubber material with AS 4020 approval. The construction of the bladder shall be of a proven design, and allow a minimum operating life of 12 years prior to replacement.

4 Manufacture

The vessel shall be manufactured in accordance with AS 4458.

4.1 Defects in Materials

Materials shall be visually examined for surface defects. Material found to have defects in excess of that permitted in the material specification or which has been damaged so as to render it unsuitable for its intended purpose, shall not be used in the construction of the vessel.

Shell and heads shall be clean and free from defects. If any component is found to have a defect, which the Contractor considers can be repaired; details of the defect together with proposed repair procedure shall be submitted in writing to the Principal's Representative. Repair work shall not be commenced until the Principal's Representative has confirmed in writing:

(a) That the proposed repair is acceptable;

(b) Any further conditions applicable as a consequence of the repair.

4.2 Cutting of Material

Plates and other parts may be cut to shape and size by machining, shearing, filing, grinding, thermal cutting or other approved methods, which will not impair the material for its intended service.

4.3 Forming of Pressure Parts

Plates for shell, ends and other pressure parts may be formed to the required shape by any process that will not impair the suitability of the material for the intended service. All forming should preferably be done by machine.

4.4 Welding

All welding shall be carried out under the supervision of a person who has had suitable training or experience in the form of construction and the process of welding used on the vessel. Such person shall hold a supervisor's certificate in accordance with AS 1796 or have other qualifications and experience acceptable to the Superintendent and the Inspecting Authority.

Vessel welding shall be conducted in accordance with AS 4458 and Water Corporation Specification WS1. Qualification of the welding procedure shall be in accordance with AS/NZS 3992.

The following shall comply with the relevant sections of AS 1210:

(a) all materials which are to be welded

(b) procedures for preparation of surfaces for welding

(c) assembly of plates and components for welding

(d) arrangement of welding joints

(e) all other applicable welding techniques during manufacture of pressure parts of the vessel

All pressure water pipe welding shall be conducted in accordance with AS 4041 Class 2P and Water Corporation Specification WS1. (Note: all pipe which is a component of the vessel shall be welded in accordance with AS 4458).

All structural steel welding shall be conducted in accordance with AS 1554.1 and Water Corporation Specification WS1.

5 Protective Coatings

5.1 General

All protective treatments shall be in accordance with Water Corporation Design Standard DS95.

Prior to coating, the vessel internal surfaces shall be prepared in accordance with Water Corporation specification A1 - Surface Preparation for the Application of Protective Coating on Steel or Cast Iron. This is followed by coating in accordance with Water Corporation specification D1 - High Build Epoxy Coating on Steel or Cast Iron. The coating used shall have AS/NZS 4020 potable water certification. The final colour shall comply with AS/NZS 2700, White N14 (RAL 9010). The internal coating shall be continuous, extending to past the faces of all flanges, allowing overlap by the vessel external coating. The coating thickness over flange faces shall fall in the range 60 - 80 microns. (Refer to drawing JZ39-91-19).

The vessel exterior shall be prepared in accordance with Water Corporation specification A1 - Surface Preparation for the Application of Protective Coating on Steel or Cast Iron. The prepared surfaces shall be coated in accordance with Water Corporation coating specification C2 - Zinc Rich Epoxy Primer, Epoxy Mastic, Polyurethane Top Coating on Steel or Cast Iron. The top coat colour shall be as specified in the completed Appendix A - Project specific requirements.

For additional information or clarification references shall be made to Water Corporation Design Standard, DS 95 -Standard for the Selection, Preparation, Application, Inspection and Testing of Protective Coatings on Water Corporation Assets.

A compatible final graffiti resistant external surface/coating shall be applied to vessels where a situational graffiti risk is assessed. The graffiti resistant paint shall be in accordance with Water Corporation technical specification J1-Anti-Graffiti Coating on Old and New Steel Structures. For further information on anti-graffiti measures references shall be made to Western Australian webpage http://www.goodbyegraffiti.wa.gov.au/.

6 Testing

6.1 General

Product shall be tested in accordance with the test requirements of this Specification. Testing shall be deemed acceptable when test outcomes have been formally verified by a Certification Body or witnessed by a Principal's Representative. Product for which a test requirement has not been met shall be classified as non-compliant Product.

The Contractor shall be responsible for conducting or having conducted all tests and qualifications specified in AS 1210 for this class of vessel and shall provide labour and appliances necessary for such tests as are required.

NOTE 1: Testing should be carried out by an organisation accredited by NATA or in accordance with ISO/IEC 17025.

NOTE 2: A testing Officer should normally be an Officer who has specialist knowledge of or training in product or materials testing appropriate to the Product characteristics to be tested.

6.2 Notification of Testing

The Corporation shall be notified in writing of each formal test proposal, allowing as a minimum the period nominated in Table 14.1, prior to the preparation of Product for testing. This notification is required to enable the Corporation to make all necessary arrangements including appointment of a testing Officer in a timely manner.

6.3 Access to the Place of Manufacture

The testing Officer shall be afforded access, at all reasonable times, to all places of manufacture of Product or Product components and shall be authorised to arrange or undertake such testing there as the Corporation deems appropriate to the testing regime specified.

6.4 Place of Manufacture other than WA

Where any Product or Product component is being manufactured other than in Western Australia the Corporation may appoint a local inspecting Officer to undertake inspections and witnessed testing as required. The testing Officer shall be provided with all due authority and permits required to carry out testing at the place of manufacture.

NOTE 1: The cost of witnessed testing arranged by the Corporation will normally be borne by the Corporation unless otherwise negotiated.

6.5 Performance Test Requirements

The testing shall include, but not be limited to, the following:

(a) Testing of material;

(b) Testing of welds;

(c) Non-destructive examination, to ensure compliance of material and construction with requirement of AS 1210;

(d) Visual examination and dimensional checks;

(e) Holiday testing.

(f) Hydrostatic tests.

6.5.1 Factory Material Tests

All materials used in the vessel shall be examined by the Contractor before fabrication.

For any item of stock material used a test certificate, detailing mechanical and chemical analysis, shall be obtained for the material at the time of its purchase.

6.5.2 Factory Hydrostatic Test

The surge vessel shall withstand the hydrostatic test of 1.5 times the design pressure of the vessel without any leakage or permanent distortion.

6.5.3 Holiday Testing

Holiday testing of the vessel coatings shall be conducted using the high voltage test method in accordance with AS 3894.1. All detected defects shall be repaired.

6.5.4 Approval of Performance Tests

One hard copy and one electronic copy of test certificates obtained from regulatory authority shall be submitted to the Principal's Representative for approval. The surge vessel shall not be despatched from the Contractor's works until the Principal's Representative has approved the surge vessel coating and test certificates, in writing.

The Contractor shall supply the signed original copies of the WorkSafe certificate to the Principal's Representative for retention by the Water Corporation Compliance Officer.

6.6 Test Facilities

Test equipment necessary for testing as specified above shall be provided by the Contractor and all equipment shall be NATA certified.

Temporary materials required for testing shall be supplied, connected, disconnected and removed by the Contractor.

6.7 Failure of Equipment

If any part of the Works fails to pass the appropriate test and checks the Contractor shall rectify the fault and repeat the appropriate tests and checks within a reasonable time at the Contractor's expense.
Faulty equipment, where supplied by the Contractor, shall be replaced by the Contractor at the Contractor's expense.

6.8 Final Test

6.8.1 Delayed Or Neglected Tests

If, in the opinion of the Principal's Representative, the tests are unduly delayed, or if the Contractor neglects to make such tests, the Principal's Representative may proceed to carry out such tests at the Contractor's risk and expense.

6.8.2 Test Sheets

Test sheets shall detail the tests conducted and the results obtained. They shall consist principally of numerical test results and "ticked box" verifications, without the need for substantial written comment.

6.8.3 Calibration Certificates

Calibration Certificates shall be provided by the Contractor for the following items:

a) Any equipment required for testing;
b) All pressure relief devices;
c) All pressure indicating devices.

6.9 Test Certificates and Results

For the purposes of acceptance, each test certificate shall, as a minimum, bear the relevant Product item serial number and shall certify that the Product item has complied with the specified test requirements.

The Contractor shall provide the Principal's Representative with typed Test Certificates. The test certificates shall include the original signed test sheets and a calibration certificate for each instrument. The Test Certificates shall be supplied to the Principal's Representative for written acceptance no later

than one (1) working week following testing. The original signed test sheet shall be delivered to the Superintendent for his retention.

Test sheets shall detail the tests conducted and the results obtained. The Contractor shall sign the Test sheets immediately on completion of the tests.

7 Marking & Packaging

7.1 Materials Identification

The Contractor shall be able to demonstrate the identity of material in accordance with AS 1210. All material shall be stamped with a heat number, which is traceable to the material batch certificates.

7.2 Name Plate

The surge vessel shall be marked with the label located in an easily readable position. The writing shall be 6mm high lettering etched and filled with black colouring onto a stainless steel plate.

The label shall comply with AS 1210 and shall include the following:

(a) Contractor's name;

(b) Surge vessel model / type and class to AS 1210;

(c) Serial Number;

(d) Functional Location Number (FL Number);

(e) Design Registration Number;

(f) Plant Registration Number;

(g) Volume (m3);

(h) Design Pressure (kPa);

(i) Hydrostatic test pressure (kPa);

(j) Date of Hydrostatic test;

(k) Weight Empty / Full (kg);

(l) Design temperature Min/Max/Normal (°C);

(m) Year of manufacture

(n) Hazard Level

(o) Pre-charge pressure

(p) Minimum shell/head thickness

(q) Corrosion Allowance (mm)

(r) Heat treatment.

All vessels shall be fitted with an engraved tag with the wording "Fill and top-up with Nitrogen only" around the charging nozzle.

7.3 Packaging

7.3.1 General

Product shall be packaged with appropriate protection, which shall prevent damage or defects as a result of handling, storage or transportation. Flexible packaging material shall have a minimum expected life in outside storage conditions of 12 months from the date of delivery.

All equipment shall be adequately packed and effectively protected against damage from moisture and handling during transport from the Contractor's works to the Site. The Contractor shall properly and carefully pack and /or protect all parts of the work ready for dispatch in accordance with the best practices having regard to the method of carriage and handling and to the climatic conditions through which it will pass whilst being transported to its final destination.

The Contractor shall take all additional measures to prevent damage to the surge vessel protective coatings.

In addition to any temporary bracing, panels carrying heavy and/or delicate equipment need special attention and removal and separate packing may be required.

Protruding threads for connections to services should be protected with proprietary caps or plugs.

7.3.2 Marking of Packaging

The Product shall be identified by marking on the outside of any protective packaging the following:

a) Material Master Record number (MMR)

b) Contract number

c) Purchase order number

8 Manuals

8.1 Format and Language

Where required, Product shall be supplied complete with appropriate installation, operation and maintenance instructions or manuals, in clear diagrammatic and text format, in English

8.2 Content

The manuals shall contain all the relevant information required to commission, operate and maintain the Product in live service, including the following:

a) Details of Product features

b) Operational adjustments

c) Installation and commissioning instructions

d) Bladder replacement procedure

e) Preventative maintenance requirements and intervals

f) Testing procedures

g) Trouble shooting guidelines

h) Complete list of parts and associated exploded views or sectional diagrams and reference part numbers

8.3 Documentation

8.3.1 Quotation submittals

The following information will be required to be submitted by the Contractor on request for quotation:

a) Detailed general arrangement drawings of the vessel with sufficient dimensions to confirm the installation requirements and maintenance access requirements.

b) Structural design loads, weight of vessel and fixing details to the concrete structures.

c) Product datasheets.

d) A detailed program for the proposed execution of the works.

e) List of all comments or exceptions to this Specification.

8.3.2 Pre-fabrication submittals

The Supplier shall prepare and submit the following documentation to the Principal's Representative for approval. No manufacturing shall proceed until all required information has been submitted and accepted in writing by the Principal's Representative.

a) Inspection and Test Plan.

b) Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR).

c) Detailed drawings with sufficient dimensions of the vessel and installation requirements.

d) Requirements for access and maintenance

e) Evidence that the design has been checked and approved in accordance with an approved Quality Assurance system.

f) Details of the surge vessel and equipment warranty.

8.3.3 Final submissions

Upon completion of fabrication of the vessel, the Contractor shall compile and submit a Manufacturer's Data Report (MDR) which shall include the following:

a) ITP
b) As-Built drawings
c) Welder Qualifications
d) Weld Procedure Qualifications
e) Material Certificates
f) Consumable Certificates
g) Testing Certificates
h) Design Calculations
i) Design Third Party verification Certificate
j) NDT Reports
k) Weld Map
l) Hydrostatic Test Report
m) Painting Report
n) Name Plate Rubbing
o) Declaration of conformity
p) Design Registration Certificate
q) Original Calibration Certificates
r) Manufacturer's data for all safety relief devices as per that shown in AS 3788:2006 Figure 2

In addition to the MDR, the Contractor shall supply an Operation and Maintenance Manual specific to the vessel. This shall include Manufacturer's and maintenance information for the burst disc, and its recommended replacement date.

The Contractor shall furnish one hard copy and one electronic copy in pdf format of the MDR and Operation and Maintenance Manual. Copies of all documents must be clear and legible. Documents provided with illegible contents will be rejected.

9 Manufacturer's Drawings

9.1 General

The Contractor shall prepare Manufacturer's drawings of sufficient detail to enable the Works to be constructed, installed and maintained effectively by competent tradespersons.

The Manufacturer's drawings shall be as recommended and approved by the Contractor and accepted by the Principal's Representative.

The Contractor shall supply to the Principal one (1) high quality A3 size print suitable for scanning, plus one electronic copy in AutoCAD Release 14 or later, of all approved and accepted Manufacturer's drawings and the final "As Constructed" drawings.

9.2 Drawing Practice

All Manufacturer's drawings produced shall be in accordance with the latest version of the Water Corporation's "Guidelines For Planset Creation, Drawing Registration And General Drawing Reference", a copy of which will be made available on loan to the Contractor free of charge for the period of the Contract.

Manufacturer's drawings shall be produced using the latest AutoCAD Release, with original sheet size A1 metric. The Water Corporation's standard base drawing sheet shall be used for all general drawings. The Water Corporation's standard AutoCAD drawing default layering scheme and process symbols as defined in their "General Drawing Reference Guidelines" shall be used on all drawings

The Manufacturer's drawings shall be of a standard ensuring the content can be easily read and understood when reproduced at A3 size and is suitable for scanning at full sheet size.

9.3 Approval of Manufacturer's Drawings

The Principal's Representative will examine the drawings submitted for approval and will return one copy to the Contractor marked either 'Accepted', 'Accepted with Corrections as Noted', or 'Returned for Correction'. Drawings returned to the Contractor for correction shall be resubmitted within fifteen (15) working days for approval as outlined in this clause. The Contractor shall not commence any manufacture until the drawings in clause A9 are accepted.

The drawings shall become the property of the Principal and shall not be varied prior to or during manufacture without the approval of the Principal's Representative. The Contractor shall rectify, at the Contractor's cost, all errors and omissions in the drawings, provided such errors and omissions have not resulted from incorrect information supplied by the Principal.

The Contractor shall within one week from notification of acceptance of the drawings, supply a further three copies of each drawing.

Prior to acceptance of Goods, the Contractor shall supply a complete set of "As Manufactured" drawings. All "as manufactured" drawings shall be signed by the Contractor as a revision to certify their accuracy. "As manufactured" drawings shall be supplied in CAD format on CD and A3 size hard copy.

Supply under the Contract shall be regarded as incomplete until all drawings have been supplied.

9.4 Required Drawings

Manufacturer's drawings shall include:

a) Detailed fabrication drawings for the construction of the vessel

10 Spare Parts and Special Tools

10.1 Bursting Disc

The Contractor shall supply a spare bursting disc with the vessel. This shall be identical to the one installed on the vessel.

10.2 Bladder

The Principals Representative shall consider the criticality of the vessel and order a spare bladder where required.

10.3 Special Tools

The Contractor shall nominate and supply any special tools required for installation and maintenance of the vessel.

11 Transportation, Handling and Storage

11.1 General

Transportation, handling and storage facilities shall be designed to prevent Product damage or defects and to maintain Product free of deleterious matter. Product shall not be dropped off elevated vehicle platforms or sites. Mechanical handling equipment shall be in accordance with AS 2550.1, AS 2550.3, AS 2550.5 and AS 2550.11 and shall be appropriate to the loads to be lifted. Manual handling shall be in accordance with the National Standard for Manual Handling and the National Code of Practice for Manual Handling, published by National Occupational Health and Safety Commission, Australia. Product restraint during transportation shall be in accordance with Load Restraint Guide—Guidelines for Safe Carriage of Loads on Road Vehicles, published jointly by the Federal Office of Road Safety and the National Road Transport Commission, Australia.

NOTE: Where wire ropes or chains are used for loading and unloading, they should not come into direct contact with Product. Lifting elements in direct contact with Product should be of a non-abrasive design eg elastomeric or fabric webbing straps. During transportation, Product restraints should be checked for tension at regular intervals of travel and should not be released until the transporting vehicle is resting in a secure stable disposition on level ground.

11.2 Preservation of Product in Storage

Product shall be stored in original Product packaging in accordance with the published requirements of the Contractor, prior to installation. Sensitive component materials shall be protected from extended exposure to direct sunlight and high temperatures e.g. elastomeric components shall be stored in accordance with the general principles of AS 1646. Designated Product storage areas shall be of sufficient size to accommodate Product deliveries and shall be flat, reasonably level and free of combustible vegetation, sharp stones or projections that could cause Product damage or defects.

11.3 Damaged Coatings

All coatings damaged as a result of transportation and handling shall be repaired as per Water Corporation Technical Specifications at the Contractor's cost. Surface preparation shall be in accordance with technical specification A1, followed by coating repair in accordance with the relevant technical specification B1 or D1.

12 Quality Assurance

12.1 Certification

12.1.1 Certification of Product

Wherever this Specification requires compliance with nominated Product and test Standards, conformance shall be certified by means of a Certification Scheme, conducted by a Certification Body. Each Certificate shall expressly attest compliance of all Product items with the nominated Standards. Wherever specified, Certificates shall be submitted to the Officer nominated for this purpose. Product shall be marked in accordance with the requirements of the Certification Body.

NOTE: Compliance of Product including related accessories and services with nominated Standards and specified requirements may be verified by means of a Product Verification Report provided by a Product Assessor. The Product Verification Report should identify all relevant Certificates of Product compliance, duly issued in accordance with Certification Scheme rules.

12.1.2 Quality System

The processes for manufacture, testing, supply, transportation, handling, delivery and storage of Product to be supplied in accordance with this Specification shall form part of a documented Quality System. The System shall be certified by a Certification Body as complying with the requirements of AS/NZS ISO 9001 and shall provide for identification and traceability, control of production and delivery to the specified destination, customer verification and control of documents and records.

12.1.3 Product Re-verification

Product compliance with the Specification shall be subject to re-verification by a Product Assessor when, during the agreed Product supply period, there occurs any:

- substantive change in Product design, material formulation or performance
- Product failure to perform in operational service to the nominated performance specification.

Re-verification shall require the issue of a new or supplementary Product Verification Report. Product components and test outcomes that are not significantly affected by the Product change or failure may be excluded from the scope of re-verification, provided that these outcomes have already been reported in a current valid Product Verification Report that is acceptable to the Corporation.

Wherever the requirements of the Specification apply to a Product supply period in excess of three years, continuing acceptance of Product shall be subject to re-verification. The purpose of re-verification shall be to confirm the continuing compliance of Product quality and production control processes with the requirements of the Specification

12.2 Compliance and Acceptance

12.2.1 Means of Demonstrating Compliance

Compliance with this Specification shall be demonstrated by means of Product Appraisal and issue by a Product Assessor of a Product Verification Report that confirms compliance. Otherwise, Product shall be deemed non-compliant and ineligible for registration as Product authorised for use in Corporation infrastructure.

NOTE 1: Where a project includes design work including Product design, Product Appraisal may form part of the project design review process and the Product Assessor may be a member of the project design review team.

NOTE 2: A Product Verification Report should verify the extent of compliance with the Specification including all relevant 'Technical Compliance Schedule' Appendices and the currency of a Certificate where relevant to the Product.

12.2.2 Acceptance Criteria

For acceptance, Product shall be supplied as specified in the Purchasing Schedule.

Prior to the implementation of any arrangement to supply Product, the Supplier shall, in accordance with specified requirements:

- nominate applicable Product Warranty terms; and
- provide documentary verification in the form of a current valid Certificate or Product Verification Report as appropriate to the Product; and
- detail each element of Product that does not comply with the specified requirements together with the extent of non-compliance.

NOTE: Where the Specification includes Technical Compliance Schedules, the nature and extent of all non-compliances should be provided in accordance with the appropriate Schedules.

12.3 Non-compliant Product

12.3.1 General

Product whose design, workmanship or performance fails to conform to the specified requirements shall be clearly tagged and quarantined by the Supplier as non-compliant and shall be subject to rejection for return to and replacement by the Supplier.

Where the Specification includes a 'Technical Compliance Schedule', Product shall be deemed non-compliant except where a Supplier has demonstrated compliance in accordance with the requirements of the 'Technical Compliance Schedule' Appendices of the Specification.

12.3.2 Manufacturing Repairs (In-process)

Welding, the use of fillers and other repairs shall generally not be permissible on Product which is in the course of production. Repairs to custom-built Products may be considered only if determined by the Corporation to be minor defect. Accordingly, details of any defect which the Contractor considers can be repaired; together with details of proposed repair procedures shall be submitted in writing for determination by the Corporation.

The Contractor shall make provision in its production Quality System and in the appropriate ITP's for sufficient hold points whenever casting defects are encountered. Production work on non-compliant components shall cease and repair work shall not commence until the following details have been confirmed by the Corporation in writing:

(a) that repair of the non-compliant components in lieu of their replacement is acceptable; and

(b) that proposed repair procedures are acceptable; and

(c) that any proposal to vary the terms of the original Product Warranty as a consequence of the in-process repair is acceptable.

12.3.3 Product Warranty

The Supplier shall replace non-compliant Product with Product that conforms to the acceptance criteria or shall repair or rectify all faults, damage or losses caused by defective Product. Except as may otherwise be specified, the Product Warranty shall indemnify and keep indemnified the Corporation against all losses suffered by the Corporation as a result of non-compliant Product for a period no less than 24 months after Product delivery or 12 months after Product installation, whichever period elapses first.

12.3.4 Product Repair

All reasonable proposals for repair or remedy of defects will be considered, provided that each such proposal is accompanied by a methodology statement that accords with the performance objectives of this Specification, as determined by the Corporation. For acceptance, a proposal for repair or remedy of Product defects shall not void or otherwise diminish the provisions of the Product Warranty.

13 Appendix A: Project Specific Requirements – *Purchasing Schedule* (Normative)

13.1 General

Project specific information and requirements, not included elsewhere in this Strategic Product Specification, shall apply as specified in the following Clauses.

13.2 Revisions to Specification Text

Notwithstanding the content of sections 1 to 12 and Appendix C of this Specification, the following amendments to the Specification shall apply and shall prevail in the event of conflict with sections 1 to 12 and Appendix C content.

13.3 Technical Requirements

Table 13.1 details project specific requirements for the bladder vessels to be procured.

The project technical requirements table below shall be completed by the designer or Principal's Representative, as applicable.

TABLE 13.1: SCHEDULE OF PROJECT TECHNICAL REQUIREMENTS

Clause	Item	Requirement
	Number of bladder vessels required	
Appendix C	MMR Number	
3.1	Volume: 1, 2 or 3m^3	
3.3	Nominal water inlet/outlet size (DN)	
	Site Location	
3.1	Design Pressure (kPa)	
	Pre-charge pressure (kPa)	
	Bladder Control Parameters:	
	Max Steady State Gas Pressure (Pump/s Running) (kPa)	
	Min Steady State Gas Pressure (Pump Stopped) (kPa)	
	Max Transient Gas Pressure (kPa)	
	Min Transient Gas Pressure (kPa)	
	Expected Number of Pressure Cycles	
	Extension legs required	Yes/No
	Height of extension legs (if required)	
5.1	External coating colour (RAL)	
	Special conditions of service (where applicable)	
	Independent 3rd Party Inspection Required	Yes/No
10	Spare Parts/Special Tools	

14 Appendix B: Technical Compliance Schedules (Normative)

14.1 Compliance Schedules

Suppliers shall demonstrate Product compliance with the Specification by completing Technical Compliance Schedule 1 as shown in **TABLE 14.1** on an item by item basis. For acceptance, the extent of scheduled technical item compliance shall be supported by verifiable documentary evidence. Each scheduled item nominates a Specification clause number with which the extent of Product compliance shall be demonstrated.

The Supplier shall denote compliance of an item by ticking the unshaded 'Yes' column appropriate to that item. Where Product does not comply with specified requirements, the Supplier shall tick the 'No' column and shall detail the reasons for non-conformance and any proposed alternatives in the 'Comments' column. The Supplier shall denote acceptance and understanding of a Specification clause by ticking the corresponding 'Noted' column wherever unshaded.

Failure to notify the Corporation of all non-compliant Product components, including the extent of non-compliance, may void an accepted offer to supply or may result in rectification of all non-compliant Product elements, at the Supplier's cost.

TABLE 14.1: TECHNICAL COMPLIANCE SCHEDULE 1

Bladder Surge Vessels					
Section/Clause		**Noted**	**Compliance**		**Comments**
			Yes	**No**	
1. SCOPE AND GENERAL					
1.1	Scope				
1.2	Referenced Documents				
1.3	Definitions and Notations				
2. MATERIALS AND COMPONENTS					
2.1	Materials				
3. DESIGN					
3.1	Standard Designs				
3.2	General Design Requirements				
3.3	Nozzles, Connections and Fittings				
3.4	Flanges				
3.5	Fasteners				
3.6	Lifting Lugs & Air Pipework Support Brackets				
3.7	Supports				
3.8	Inspection Openings				
3.9	Over Pressure Protection				
3.10	Bladder				
4. MANUFACTURE					
4.1	Defects in Materials				
4.2	Cutting of Material				
4.3	Forming of Pressure Parts				
4.4	Welding				
5. PROTECTIVE COATINGS					
5.1	General				
6. TESTING					
6.1	General				
6.2	Notification of Testing				
6.3	Access to the Place of Manufacture				
6.4	Place of Manufacture other than WA				
6.5	Performance Test Requirements				
6.6	Test Facilities				
6.7	Failure of Equipment				
6.8	Final Test				
6.9	Test Certificates & Results				
7. MARKINGS AND PACKAGING					
7.1	Materials Identification				
7.2	Name Plate				

7.3	Packaging				
8. MANUALS					
8.1	Format and Language				
8.2	Content				
8.3	Documentation				
9. Contractor's Drawings					
9.1	General				
9.2	Drawing Practice				
9.3	Approval of Contractor's Drawings				
9.4	Required Drawings				
10. SPARE PARTS					
10.1	Bursting Disc				
10.2	Bladder				
10.3	Special Tools				
11. TRANSPORTATION, HANDLING AND STORAGE					
11.1	General				
11.2	Preservation of Product in Storage				
11.3	Damaged Coatings				
12. QUALITY ASSURANCE					
12.1	Certification				
12.1.1	Certification of Product				
12.1.2	Quality System				
12.1.3	Product Re-verification				
12.2	Compliance and Acceptance				
12.2.1	Means of Demonstrating Compliance				
12.2.2	Acceptance Criteria				
12.3	Non-compliant Product				
12.3.1	General				
12.3.2	Manufacturing Repairs (In-process)				
12.3.3	Product Warranty				
12.3.4	Product Repair				

Name of Supplier:

Signature: Date:

When requested by the Corporation, the Supplier shall provide the information required by Technical Compliance Schedule 2 as shown in **TABLE 14.2**.

TABLE 14.2: TECHNICAL COMPLIANCE SCHEDULE 2

Bladder Surge Vessels			
1.	**SUPPLIER'S REPRESENTATIVE**		
1.1	Full Name		
1.2	Postal Address		
1.3	Facsimile Number		
1.4	Phone Number		
3.	**QUALITY ASSURANCE**		
3.1	Extent of Third Party Accreditation of Supplier		
3.2	Extent of Third Party Accreditation of Contractor		
3.3	Details of Certificates and Verification Reports Attached	(Yes/No)	
4.	**TECHNICAL INFORMATION**		
4.1	Performance information eg inflow/outflow curves	(Yes/No)	
4.2	Details of the Contractor's inspection and testing plans supplied.	(Yes/No)	
4.3	Details of servicing facilities in Perth supplied.	(Yes/No)	
4.4	Additional pamphlets and drawings in conjunction with the technical literature supplied.	(Yes/No)	
5.	**VESSEL DESIGN & MANUFACTURE**		
5.1	Contractor's Name		
5.2	Place of Manufacture		
5.3	Registered Design Drawing Number		
5.4	Number of Vessels		
5.5	Design Capacity (m^3)		
5.5	Design Pressure (kPa)		
5.6	Nominal Diameter (mm)		
5.7	Nominal Height (mm)		
5.8	Operating Fluid		
5.9	Design Code/Class		
5.10	Design ambient air temperature, Min/Max/Nominal (^oC)		
5.11	Design water temperature (^oC)		
5.12	Wind Design Code		
5.13	Seismic Design Code		
5.14	Allowable wind velocity/pressure		
5.15	Allowable wind moment at base / Shear at base		
5.16	Allowable earthquake loadings		
5.17	Allowable earthquake moment at base / Shear at base		
6.	**TESTING**		
6.1	Hydrostatic test pressure (kPa)		
6.2	Test medium		
7.	**CONSTRUCTION MATERIALS**	***Material***	***Thickness (mm)***
7.1	Shell		
7.2	Dished ends		
7.3	Nozzles		
7.4	Flanges		
7.5	Legs/Brackets/Lifting Lugs		
7.6	Internal bolts/nuts		
7.7	External bolts/nuts		
7.8	Gaskets		
7.9	Bladder		
7.10	Fittings		
7.11	Internal grating		

7.12	Burst disc	
8.	**COATING**	
8.1	Internal coating specification	
8.2	External coating specification	
9.	**OVERALL DIMENSIONS**	
9.1	Weight empty (kg)	
9.2	Weight full (kg)	
9.3	Weight operating (kg)	
9.4	Water inlet/outlet – nominal size	
9.4	Flanges – code/class/pressure rating	

Name of Supplier:

Signature: Date:

15 Appendix C: Material Master Records (Informative)

The following Material Master Records (MMR) comprise Corporation catalogue numbers that are unique to the particular products described for the purposes of Corporation activities or work.

MMR	PURCHASE ORDER LONG TEXT (Bladder Surge Vessels – PN16)
21588	Tank, Pressure; Vessel; Bladder Type; PN16; 1m3 (1000) Litres; 834mm ID x 1500mm Shell; DN150 Inlet/Outlet; To AS1210-2010 Class 2A; Manufactured to Charlatte Reservoirs Drawing KV003M00008 Rev. 5 and in Accordance with Water Corporation Strategic Product Specification SPS249.
21589	Tank, Pressure; Vessel; Bladder Type; PN16; 2m3 (2000) Litres; 980mm ID x 2200mm Shell; DN200 Inlet/Outlet; To AS1210-2010 Class 2A; Manufactured to Charlatte Reservoirs Drawing KV007M00007 Rev. 7 and in Accordance with Water Corporation Strategic Product Specification SPS249.
21590	Tank, Pressure; Vessel; Bladder Type; PN16; 3m3 (3000) Litres; 1476mm ID x 1100mm Shell; DN200 Inlet/Outlet; To AS1210-2010 Class 2A; Manufactured to Charlatte Reservoirs Drawing KV011M00002 Rev. 7 and in Accordance with Water Corporation Strategic Product Specification SPS249.

MMR	PURCHASE ORDER LONG TEXT (Bladder Surge Vessels – PN21)
21741	Tank, Pressure; Vessel; Bladder Type; PN21; 1m3 (1000) Litres; 834mm ID x 1500mm Shell; DN150 Inlet/Outlet; To AS1210-2010 Class 2A; Manufactured to Charlatte Reservoirs Drawing KV017M00000 Rev. 3 and in Accordance with Water Corporation Strategic Product Specification SPS249.
21742	Tank, Pressure; Vessel; Bladder Type; PN21; 2m3 (2000) Litres; 980mm ID x 2200mm Shell; DN200 Inlet/Outlet; To AS1210-2010 Class 2A; Manufactured to Charlatte Reservoirs Drawing KV018M00000 Rev. 1 and in Accordance with Water Corporation Strategic Product Specification SPS249.
21743	Tank, Pressure; Vessel; Bladder Type; PN21; 3m3 (3000) Litres; 1476mm ID x 1100mm Shell; DN200 Inlet/Outlet; To AS1210-2010 Class 2A; Manufactured to Charlatte Reservoirs Drawing KV016M00000 Rev. 4 and in Accordance with Water Corporation Strategic Product Specification SPS249.

END OF DOCUMENT